NPIC/TSSG/DED-1328-68
20 August 1968

MEMORANDUM FOR: Chief, Procurement Division, OL

SUBJECT: [redacted] 25X1

1. The subject contract is for the fabrication of a Prototype Twin-Stage, On-Line P.I. Comparator and a Precise Measuring Comparator. The contractual specifications between the Government and [redacted] 25X1
for the Twin-Stage Comparator require the contractor to modify a [redacted] 25X1
25X1 [redacted] High Power Stereo Comparator Head to meet the optical performance criteria set forth in those contractual specifications. In the attached letter dated 24 July 1968, the contractor submitted a request for approval of the Specifications for a [redacted] High Power Stereo Comparator 25X1
Head prior to submitting them to [redacted] for the purchase of that instrument 25X1
in its unmodified form. After modification by [redacted] the optics will be 25X1
incorporated into the Prototype Twin Stage On-Line P.I. Comparator.

2. Because the Contractor is responsible for meeting the performance specifications of the end item, i.e., the total comparator (the [redacted] High- 25X1
Power Stereo Comparator Head being a component part of that end item)
25X1 and because [redacted] is modifying the instrument purchased from [redacted] 25X1
25X1 it should be understood by [redacted] that the suggested additions to the Specifications contained in paragraph 3 are not a warranty by the Government
25X1 that the inclusion of the [redacted] High-Power Stereo Comparator Head meeting these specifications as modified in the prototype comparator assures compliance with the contractual specifications between [redacted] and the Govern- 25X1
ment. In other words, none of the contractual specifications are relaxed by any approval of these specifications by the Government. It is therefore recommended that
25X1 [redacted] be made aware of the suggested modifications to the proposed specifications as outlined below, but that it be understood that the suggestions impart no warranty by the Government that the end item will conform to the specifications of subject contract.

3. It is suggested that the attached specifications be modified as follows:

a. Add to the first paragraph page 2 of the specifications the following:

SUBJECT: [redacted] 25X1

" ... a knurled knob for turning and number to indicate approximately the amount of image rotation." An image of a point in the object plane centered in the field-of-view will not move out of a 2.0 mm diameter circle centered in the eyepiece focal plane when the image is rotated through 360°.

b. The first full paragraph on page 2 refers to the reticle to be mounted in the optical path. It should be described as follows:

The reticle to be provided will consist of an engraved and filled black dot, 0.020 ± .004 mm, in the center of the field-of-view and two lines each 0.020 ± .004 mm by 0.500 ± 0.020 mm pointing to the dot and 180° apart. When mounted in the optical path, it is absolute essential that the dot from each reticle be superimposed one over the other so that only one dot appears to the viewer. The lines of the reticle in one of the optical paths shall be vertical and the lines of the reticle in the other path shall be horizontal. The dots shall remain superimposed for all combinations of settings of the two image rotation prisms in conjunction with all the combinations of the two objective lens sets. The reticles shall be permanently mounted in the optical paths and shall not be capable of operator movement. Superimposition of the dots will be maintained regardless of the interpupillary Distance Setting.

[redacted] 25X1
Chief, Technical Services & Support Group
NPIC

Attachment: a/s

Distribution:
Original - Addressee
1 - NPIC/TSSG
1 - NPIC/TSSG/DED
2 - NPIC/TSSG/DED/R&DBr-I

25X1 NPIC/TSSG/DED/R&DBr-I/JED/hh[redacted] (20 Aug 68)

[redacted] 25X1

July 24, 1968

U.S. Government

25X1 Attention: [redacted]

We are enclosing two copies of the specification [redacted] 25X1
25X1 [redacted] for the manufacture of a High Power Stereo Comparator Head. When reading this specification, please note in writing any additions or corrections you personally feel are necessary to assure satisfactory performance of the Stereo Comparator
25X1 Head. The intent of the [redacted] is to include the corrections noted on the copy returned to us in the specification prior to ordering the
25X1 Stereo Head from [redacted]

Please forward written approval of the enclosed specification at your earliest convenience so a purchase order may be placed with [redacted] 25X1
25X1 [redacted] in the near future.

Thank you for your cooperation in this matter.

Very truly yours,

[redacted] 25X1

Asst. Manager, Engineering

HBB:pc

Enclosure: (2)

25X1

[redacted]

July 17, 1968

SPECIFICATION FOR [redacted] HIGH POWER 25X1

STEREO COMPARATOR HEAD

This instrument is to be used as the optical viewing subsystem of a photographic measuring instrument. It is a major redesign of the High Power Stereoviewers manufactured on previous contracts with the U.S. Government. The primary change is in the optical system, to enable the reticles to be placed in an intermediate image plane, rather than in the eyepieces where they can be displaced when adjusting the inter-pupillary distance (IPD). Mechanical changes are required to accommodate the optical changes. In addition, the eyepiece angle will be adjustable.

The instrument consists of two [redacted] Dynazoom Laboratory 25X1
Microscopes coupled with an optical system to form a stereoviewer. The Dynazoom pod has a continuously variable magnification from 1X to 2X. A magnification range from 7.8X to 200X is covered with 6X and 10X [redacted] 25X1
Compensating Widefield eyepieces and 1.3X, 3.0X, 6X, and 10X objectives. The 3.0 and 6X objectives are not both needed to cover the magnification range, but the 3.0X objective gives a wider field and the 6X objective gives higher resolution.

Each optical system consists of an objective, the zoom elements, a penta prism to direct the path horizontally, an image rotation prism (Pechan), reticle, a field lens, a mirror to incline the path toward the eyepieces, a 1X relay lens, a field lens, and the eyepiece.

The following objectives are to be used with this instrument:

Catalog#		Magnification	Focal Length	Numerical Aperture
25X1 [redacted]	Special Order	1.3X		
25X1 [redacted]	Fluotar (5100)	3.0X	26.3 mm	0.10
	Fluotar (5105)	6X	21.0 mm	0.20
	Fluotar (5050)	10X	15.0 mm	0.45

The objective lenses are mounted in a four-position centerable nose-
25X1 piece. The [redacted] 3X, 6X and 10X objectives are parfocal and require very little refocusing when changing objectives.

25X1 The 1.3X [redacted] objective is a special, wide field lens designed primarily to help locate the object to be measured. These lenses have to be accommodated in the final system but are not a part of this order.

The zoom is adjusted by means of a knob on the top of each pod. It is graduated from 1X to 2X in tenths. The ability to provide monocular viewing or photomicrography is not included.

The Pechan prism rotates the image continuously without limit. An 180° rotation of the prism rotates the image 360°. The prism mount has

a knurled knob for turning and numbers to indicate approximately the amount of image rotation.

The reticle is mounted in a two-position slide, so that the reticle will consist of an engraved and filled black dot, 0.020± .004 mm, in the center of the field.

The IPD of the eyepieces is adjustable by means of a lever through a range of 55 to 72 mm. The eyepieces are nominally 30° to the horizontal and are adjustable ± 7-1/2° for operator convenience.

Adjustment of the eyepiece angle causes image rotation. A graduated scale reads the eyepiece angle. This angle must be transferred to a slip ring to set the "Zero" index for the Pechan prism which automatically compensates for the image rotation due to changing the eyepiece angle.

The centers of the objectives will be nominally 12.102 inches apart.

During the course of a measurement sequence, the Zoom knob and the image rotation prism must not be rotated. The nosepiece must not be rotated nor the centering adjustment moved.

The following eyepieces are to be used:

Catalog #	Magnification
25X1 [ ] Compensating (5551)	6X
[ ] Compensating (5583)	10X

Resolution, field of view, etc. depend on the combination of eyepiece and objectives used and the position of the zoom system. The following table gives the nominal field size for combinations of the above listed eyepieces and objectives when the zoom is at 1X. When the zoom is at a position other than 1X, the total magnification is multiplied by the zoom magnification, and the field is divided by the zoom magnification.

Eyepiece	Objective	Magnification	Field
6	1.3	7.8	14.0mm
6	3.0	18	6.0mm
10	1.3	13	14.0mm
6	6	36	3.0mm
10	3.0	30	6.0mm
6	10	60	1.8mm
10	6	60	3.0mm
10	10	100	1.8mm

25X1 With the 10X [ ] eyepieces, the zoom at 2X and the 10X [ ] 25X1
Fluotar objectives, the instrument will have a maximum axial resolution of approximately 1200 lines per mm., under the same conditions with the
25X1 6X [ ] Fluotars approximately 630 1/mm and with the 3X [ ] Fluotar 25X1
approximately 320 1/mm.